## AERATED STEAM WORKS

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Aerated steam for pasteurization of greenhouse soils has many merits. The lower temperatures allow many beneficial species of microbes to survive. The steam-air mixture should penetrate the soil more thoroughly if the mechanics of the installation are correct. Pathogens reintroduced by chance will find fewer opportunities to spread without inhibition. Loss from disease may be reduced. (Aldrich et al, 1974)

Aerated steam pasteurization is accomplished by mixing steam with compressed air. This serves to reduce the temperature of the steam (now really a hot air-water vapor mixture) and provides a vehicle (the air) to carry it through the soil and provide more thorough heat distribution. In this way, the pasteurization temperature may theoretically be reduced from 180°F to as low as 140° for 30 minutes.

This paper considers the efficacy of lower pasteurization temperatures in the elimination of Fusarium roseum from infected soils. In studies concerned with the biological control of Fusarium sp. by an Arthrobactor sp. capable of reducing furarial diseases, a routine thermal death point was determined. Spores of F. roseum were grown in liquid media and suspended in water. This was heated to specified temperatures and held at these temperatures for exactly 10 minutes.

Suprisingly, a number of the conidia survived a temperature of 158°F (70°C). Since 140°F (60°C) has been reported as sufficient to kill F. roseum,

it was decided to test aerated steam according to the current commercial recommendations.

A composite soil was mixed with an equal weight of quartz sand. It was amended with (1) dried and milled carnation tissue, (2) sucrose plus potassium nitrate to give a 10:1 ratio of C:N, and (3) control (no addition). These were sterilized (not simply pasteurized).

To these soils, a suspension of spores was introduced and thoroughly mixed. They were then incubated for 3 weeks.

Portions of these incubated soils were placed in beakers and subjected to aerated steam. To approximate commercial conditions, the temperatures were raised slowly over a 30 minute period, then maintained at the specified temperature for 30 minutes. The samples were then removed and allowed to cool to room temperature.

High numbers of F. roseum spores survived 131°F (55°C). But at 140°F, no growth of F. roseum was observed.

The results of these experiments would indicate that aerated steam pasteurization of soil at a temperature of 140°F for a period of 30 minutes is sufficient to kill F. roseum. It would seem that only in instances of inadequate heat penetration of the soil would this plant pathogen survive and pose a threat to a greenhouse crop.

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Aldrich, R.A., P.J. Wuest & J.A. McCordy. 1974. Treating soil, soil mixtures, or soil substitutes with aerated steam. Penn. State Univ. Spec. Circ. 182.